

NAVIGATION.

Stages of Water in Rivers.—In the table, on the right hand side of chart No. III, are given the highest and lowest readings of the Signal Service river gauges during the month, with dates of same. At Omaha the Missouri rose ten inches above the danger-line on the 28th and 29th, and the consequent damage is noticed under the head of floods. At Vicksburg the Mississippi was within six inches of the "danger-line" from the 8th to the 14th.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—1st, Ill., Ind., Iowa, Kan., Mo., Neb., N. J., Mich. 2nd, Kan., Ark., Ill., Iowa, Kan., Mo., Tex., Va., Neb., Ind. T., Ohio, Ind. 3rd, Ark., Fla., Kan., La., N. Y., Ohio, Tex., Va., Miss., Ala., Tenn. 4th, Me., N. J., N. C., Ohio, Pa., Vt., Va., Ala., Fla., Tenn., Md. 5th, N. J., N. C., Va. Dak., W. Va., Tenn., Ga. 6th, Ind. T., Wy. T., Col., N. C. 7th, Mich., Ark., Ill., Ind., Iowa, Kan., Ky., Neb., N. Y., Ohio, Pa., Tex. 8th, N. M., N. Y., Ark., Ill., Ind., Ky., La., Mich., Neb., N. C., Ohio, Pa., Tenn., Tex., Va., Miss., Ala., Wis., W. Va. 9th, N. Y., Tex., Va. 10th, Ind., Mich. Pa., Va., Tex., W. Va., Va., Me. 11th, Wy. T., Dak., Me., Neb., Vt., Tex. 12th, Fla., Col. 13th, Ind. Ty., Ark., Fla., Tex., Miss., Tenn. 14th, Ga. 15th, Ind. Ty., Dak., Kan., Mich., Neb. 16th, Fla., Ky., La., Ala., 17th, Kan., Wy. T., Ill., Iowa, Mo., Neb., N. C., Ind. T., Miss., La. 18th, Mich., Ark., Ill., Ind., Iowa, Kan., Ky., La., N. Y., Ohio, Tex., Miss., Mo., Minn., Tenn., N. C., Fla. 19th, Minn., Ill., Ind., Iowa, Kan., Ky., La., Mich., Neb., N. Y., Ohio, S. C., Tenn., Cal., Ala., Wis., Fla., Ga. 20th, Ill., Ind., La., N. Y., Ohio, Pa., Tex., Wis., Nev., Col., Ala., Mich., W. Va. 21st, Ind. Ty., Me., Va., Wy. T., Ark., Del., Ill., Kan., Ky., La., Md., N. J., N. Y., Pa., S. C., Tex., Va., W. Va., Ala., Fla., Ga. 22d, Ark., Dak., Fla., Ill., Kan., Neb., N. J., Ind. T., Minn. 23d, Ind. T., Mich., Neb., Fla., Ill., Iowa, Kan., Mich., Va., Wis., Dak., Mo., Minn., Ga.; 24th, N. M., N. Y., Wy. T., Ark., Ill., Ind., Kan., Md., Mich., Pa., Tenn., Va., Mo., Ohio, W. Va., N. C. 25th, Dak., Ill., Kan., Ky., Mass., N. H., N. C., Tenn., Vt., Va., Col., Tex., Ind. Ty. 26th, Ill., Iowa, Mass., N. Y., N. C., Pa., Tex., Vt., Va., S. C., Ga., N. H. 27th, Dak., La., Me., S. C., Vt., Col., Wy. T., N. b., Ala., Miss., Ga.; 28th, Ind. Ty., Dak., Ill., Iowa, Neb., Kan., N. C., Mass. 29th, Fla., Ill., Ind., Iowa, Kan., Mo., Wy. T., Neb., Dak., Fla. 30th, Ind. Ty., Neb., Va., Dak., Del., Ill., Iowa, Md., Mo., N. J., N. C., Tenn., Tex., Va., W. Va., Fla., Minn. 31st, Minn., Fla., Ill., Iowa, Mo., Neb., Pa., Ind. T.

Auroras.—Washington, D. C., 11th; Burlington, Vt., 18th; Detroit, Mich., 24th; Oswego, N. Y., 26th, 30th.

Magnetic Phenomena.—Prof. G. Hinrichs, Iowa City, Iowa, reports the average magnetic diurnal range in declination as 8.36 minutes.

Telegraphic Communication Interfered with by Atmospheric Electricity.—Pike's Peak, Col., 7th, heavy thunder-storm, compelled to cut out wires; 12th, wires cut out, but sparks would still pass between windows; 22nd, severe electricity, had to cut out wires; 26th, intense electricity. Santa Fe, N. M., 9th, intense, 17th, 24th and 25th. Norfolk, Va., 30th, wires badly affected, cable arrester at Lynn Haven fused by lightning. Mt. Washington, 26th, wires powerfully affected, compelled to withdraw switch cut-out.

OPTICAL PHENOMENA.

Solar Halos.—1st, N. Y. 2nd, N. Y., Iowa, Me., Ohio. 4th, S. C. 5th, Cal., R. I., Me., N. Y. 6th, Ohio, Ky., R. I., Me., Mass., Conn., Ill., Ind., N. H., N. Y. 7th, R. I., Iowa, Conn., Dak., Mass., N. H., N. J., Ohio. 8th, Ohio, Conn. 9th, La., Miss. 10th, Miss. 11th, Cal., S. C., Ga., Miss. 12th, Cal., S. C., Ga. 13th, Ohio, Ill., Ind., Iowa, Md., W. Va. 14th, Fla., Minn., Ohio, N. J., Ill., N. Y., Pa. 15th, Tex., Ky., Iowa, Conn., Ind., Mass., N. H., Miss. 16th, Cal., Ohio, S. C., Ga., N. H., N. J., Md. 17th, R. I., Ill., Iowa, Mich., N. H., N. Y. 18th, Mich., Ohio, Me., Ind. 19th, N. H., Mass. 20th, N. H., Va. 21st, Cal., Conn., N. Y., Miss. 22nd, Iowa, Ohio, Ky., Ga., Ind., Miss. 23rd, Ala., Tenn., Miss. 24th, Ohio, R. I., Ark., Ill., Ind., N. H. 25th, Ohio, Mich., Tenn., R. I., Conn., Iowa, Vt., Miss. 26th, Ohio, Conn., Tex., Vt. 27th, Cal., Ohio, Md., N. J. 28th, Cal., Ohio. 29th, Cal., Dak., Ohio, Iowa, N. J., Pa., 30th, Cal., Dak. 31st, Nev., Wis.

Lunar Halos.—1st, Mich. 3rd, N. Y. 5th, Minn., Conn. 6th, Dak., Neb., Iowa, Mo., Ind., Me., Ohio, Pa. 8th, S. C., N. J., N. C. 9th, Col., Tex., Ala., Fla., Miss., Mo., Minn. 10th, Wy. Ty., Nev., Kan., Tex., Fla., Miss., Mo., Minn., La., Wis. 11th, Col., Neb., Tex., La., Miss., Minn., W. Va., N. C., Ga., Mass. 12th, Nev., Dak., Ind. Ty., La., Minn., S. C., N. C., Ga., Iowa, N. J. 13th, Dak., Tex., Mich., Wis., Ohio, N. Y., W. Va., Pa., Conn., Ill., Ind., Iowa, Mass. 14th, Kan., Tex., Fla., Minn., Mich., Ohio, N. Y., R. I., Mass., Conn., Pa. 15th, Wy. Ty., La., Tex., Fla., Wis., N. Y., Ind., Ohio, Ky., Va., W. Va., Miss. 16th, Kan., N. Y., N. J., Pa. 17th, Mich., N. Y., Ind., S. C., R. I., Mass., Conn. 21st, Ind. Ty. 24th, La., Ill. 28th, Neb., Ind. Ty. 29th, Dak., Ind. Ty.

Mirage.—Olivet, Dak., 1st; New London, Conn., 6th, 7th, 24th.

MISCELLANEOUS PHENOMENA.

BOTANICAL.—Arkansas—Judsonia, ripe, 19th, blackberries; 25th, wheat; 26th, peaches ripening. Connecticut—New London, in bloom, 25th, snow-ball; leafing, 26th, polonia: Dakota—Olivet, all crops look favorable. Florida—Milton, in bloom, 21st, early corn; 31st, green corn fit for use.

Georgia—Savannah, in bloom, 1st, magnolia. Illinois—Riley, 7th, planting corn. Iowa—Fort Madison, in bloom, 2nd, snowballs; 3rd, rose, spirea; 13th, locust; Monticello, in bloom, 1st, lilacs; 4th, snowballs; ripe, 20th, strawberries; Guttenberg, wheat injured by the chintz bug; grass in fine condition; Nora Springs, in bloom, 4th, lilacs; 20th, dandelions, strawberries, apples, mandrake; Vail, corn poor; small grains looking well. Indian Territory—Ft. Gibson, ripe, 26th, cherries, blackberries; 28th, whortleberries. Kansas—Independence, ripe, 22nd, barley; 27th, wheat; 13th, cherries; 25th, raspberries, dewberries; 27th, currants; 31st, gooseberries; 30th, oats heading. Maine—West Waterville, in bloom, 7th, plum, cherry; 10th, apple; Cornish, in bloom, 2nd, shadbush; 5th, cherry; 8th, pear; 11th, apple; 13th, blueberry; 18th, horse-chestnut; leafing, 3rd, forest trees, horse-chestnut. Massachusetts—Somerset, in bloom, 1st, pear, buttercups; 5th, wild columbine; 8th, apple; 12th, quince, lilac; 17th, bush honeysuckle; 20th, spirea; Waltham, in bloom, 1st, shad bush; 3rd, white birch; 4th, blue berry; 5th, apple; 4th, pear; 7th, sassafras; 16th, lilac; 23rd, cherry; 24th, horse chesnut; 25th, barberry; 27th, white thorn; 29th, blackberry; Fall River, in bloom, 1st, pear; 6th, apple; New Bedford, in bloom; 8th, dogwood; 10th, lilac; 20th, hawthorn; leafing, 9th, oak; Rowe, in bloom, 6th, cherry; 12th, apple. Michigan—Northport, fruit prospects favorable, hay and grain promise well; in bloom, 7th, cherry; 8th, plum, 9th, pear. Mississippi—Brookhaven, in bloom, 2d, lillies; 4th, persimmon; 5th, jessamine and magnolia; 20th, early corn; 26th, early cotton; ripe, 26th, oats; 10th, plums, whortleberries; 13th, blackberries; 12th, cherries; 31st, crops very promising. Missouri—St. Louis, ripe, 5th, strawberries; Louisiana, ripe, 31st, raspberries; Mississippi county, 12th, wheat harvested; Sikeston, 24th, wheat harvested; Butler county, 29th, 30th, wheat harvested; Mexico, in bloom, 3d, wheat; Lebanon, ripe, 26th, cherries; 30th, blackberries. New Hampshire—Contoocookville, in bloom, 8th, pear, currant, strawberry; leafing, 8th, grape. New Jersey—Newark, in bloom, 5th, horse-chesnut. New York—Wappinger's Falls, in bloom, 10th, tulips; 14th, horse-chesnut; 18th, rye, roses; 20th, peonies; ripe, 18th, maple seeds; 21st, strawberries; leafing, 2d, maple; 14th, locust; 2d, grass sufficient for pasture, oats up; Palermo, in bloom, 3d, apple; 10th, lilac; 16th, horse-chesnut; 27th, yellow daisies; 30th, blackberry; 8th, planting corn; Nile, in bloom, 10th, apple; Waterburg, in bloom, 1st, pear, apple. North Carolina—Fayetteville, in bloom, 1st, magnolia; ripe, 14th, raspberries; Weldon, cotton seed rotting in ground, because of cold, damp weather. Ohio—Margaretta Township, in bloom, 2nd, quinces; Ringgold, grass growing slowly; fruit prospects good; wheat the most forward for many years; potatoes very much advanced. Pennsylvania—Egypt, in bloom, 1st, apple; 6th, quince; Carlisle, heading, 8th, wheat; 28th, oats. Tennessee—Nashville, 11th, cotton and other crops fifteen days early. Texas—Clarksville, 31st, corn looks well; wheat harvested and oats ripe; cotton injured by wet weather; Melissa, wheat harvested, several days earlier than for many years; 31st, corn in tassel, never known here so early before; notwithstanding the season has been cool, crops are further advanced than for twenty-six years. Virginia—Wytheville, ripe, 25th, strawberries; 30th, cherries, new potatoes; near Keswick, 31st, oats in fine condition; corn 12 to 18 inches high; cherries ripe; crops well advanced; near Johnsontown, in bloom, 1st, roses. Vermont—West Charlotte, in bloom, 1st, cherry; 7th, dandelions; Strafford, in bloom, 6th, plum; 9th, wild cherry; 15th, apple; Woodstock, in bloom, 3rd, plum. Wisconsin—Embarrass, in bloom, 1st strawberry; 2nd, apple, wild cherry, wild gooseberry; Wautoma, in bloom, 11th, lilac; 31st, roses; 31st, small grain looks very well; Milwaukee, in bloom, 19th, mandrake, ivy and locust; leafing, 19th, poplars.

BIRDS.—*Wild Geese*: Cornish, Me., 1st; Wappinger's Falls, N. Y., 1st. *Kingbird*: Monticello, Iowa, 21st; Cornish, Me., 8th; Waltham, Mass., 11th; Rowe, Mass., 8th; Plattsburgh, Neb., 2nd; Palermo, N. Y., 18th; West Charlotte, Vt., 21st; Embarrass, Wis., 7th. *Swallows*: Monticello, Iowa, 24th; Cornish, Me., 1st; Plattsburgh, Neb., 4th; Woodstock, Vt., 1st; Embarrass, Wis., 2nd. *Robin*: Clear Creek, Neb., 13th. *Cuckoo*: Contoocookville, N. H., 24th; Palermo, N. Y., 23rd; Strafford, Vt., 25th; Embarrass, Wis., 14th. *Orioles*: Cornish, Me., 1st; Somerset, Mass., 1st; Waltham, Mass., 4th; Rowe, Mass., 9th; New Bedford, Mass., 3rd; Wappinger's Falls, N. Y., 5th; Palermo, N. Y., 8th; North Volney, N. Y., 6th; Catawissa, Pa., 2nd; West Charlotte, Vt., 4th; Woodstock, Vt., 4th; New London, Conn., 3rd; *Whippoorwill*: Southington, Conn., 5th; Monticello, Iowa, 8th; Cornish, Me., 6th; Waltham, Mass., 2nd; Clear Creek, Neb., 14th; Catawissa, Pa., 3rd; Woodstock, Vt., 8th; Embarrass, Wis., 1st. *Bobolinks*: Southington, Conn., 17th; Monticello, Iowa, 27th; Cornish, Me., 6th; Somerset, Mass., 4th; Waltham, Mass., 7th; Rowe, Mass., 8th; West Charlotte, Vt., 21st; Strafford, Vt., 15th; Woodstock, Vt., 7th; New London, Conn., 6th. *Catbirds*: Cornish, Me., 1st; Waltham, Mass., 3rd; New Bedford, Mass., 10th; Palermo, N. Y., 22nd; Catawissa, Pa., 5th; West Charlotte, Vt., 21st; Strafford, Vt., 26th. *Hummingbirds*: Wappinger's Falls, N. Y., 22nd; Palermo, N. Y., 7th; Catawissa, Pa., 19th; West Charlotte, Vt., 7th; Embarrass, Wis., 7th. *Martins*: Embarrass, Wis., 7th. *Thrush*: Waltham, Mass., 9th; Northport, Mich., 1st; Wappinger's Falls, N. Y., 12th; Woodstock, Vt., 8th. *Blackbirds*: Northport, Mich., 1st; Clear Creek, Neb., 21st.

MISCELLANEOUS.—*Frogs piping*: Southington, Conn., 5th; Embarrass, Wis., 5th. *Po'ato bugs*: Litchfield, Mich., 31st; New London, Conn., 6th; Morgantown, W. Va., 6th. *Rose bugs*: near Johnsontown, Va., 2nd. *Fireflies*: Southington, Conn., 28th; Logan, Iowa, 1st; Cornish, Me., 24th; North Volney, N. Y., 24th; Kensico, N. Y., 19th; Little Mountain, Ohio, 21st; Green Castle, Pa., 25th; Morgantown, W. Va., 23rd. *Crickets*: Contoocookville, N. H., 16th; Wappingers Falls, N. Y., 18th. *Bees*: Embarrass, Wis., swarmed, 7th. *Mosquitos*: Embarrass, Wis., 28th. *Currant worm*: Bellefontaine, Ohio, 23rd. *Apple worm*: Bellefontaine, Ohio, 31st. *Bats*: Strafford, Vt., 19th. *Grasshoppers*: Dodge City, Kan., 28th.

appearing from the south, swarms not large; Winnemucca, Nev., 24th, myriads appeared in Paradise valley, 20 miles NNE. of station, considerably damaging crops. Brackettville, Tex., 31st, 8 p. m., small black, hard-shelled bugs, resembling flying ant, appeared in such numbers as to make it impossible to stay within doors; at 9 p. m. had to close office in consequence.

Polar Bands.—Maine, 16th, 24th, 25th, 31st; Connecticut, 8th; New Jersey, 7th, 19th, 27th; Virginia, 27th; Indiana, 6th, 19th, 22nd, 24th, 31st; Iowa, 2nd, 3rd, 6th, 13th, 15th, 22nd, 31st; Louisiana, 4th; Nebraska, 5th; Dakota, 27th.

Prairie and Forest Fires.—23rd; Ft. Union, N. M.; 29th, near Wareham, Mass., extensive forest fires; 31st., Bismarck, Dak.

Meteors.—Madison Barracks, N. Y., 27th; Judsonia, Ark., 6th, 9th, 19th; Southington, Conn., 6th; Mayport, Fla., 28th; Anna, Ill., 28th; Como, Ill., 26th; Iowa City, Iowa, 4th; Near Woodstock, Md., 1st, 5th, 6th, 10th, 18th, 21st, 23d, 29th; Rowe, Mass., 2d, 5th, 18th, 23d, 31st; Lebanon, Mo., 28th; Clear Creek, Neb., 25th; Atco, N. J., 26th, 29th; Hector, N. Y., 16th, 8.00 p. m., brilliant meteor moved from W. to E., light very intense, appeared as large as full moon, with train about four times its own diameter; Waterburg, N. Y., 2d, 5th, 23d; Wappingers Falls, N. J., 28th; Fayetteville, N. C., 23d; Cincinnati, Ohio, 27th; Hulmersville, Pa., 10th; Green Castle, Pa., 5th; Aiken, S. C., 25th; Dodge City, Kan., 17th; Davenport, Iowa, 21st, (during bright moonlight); Ft. Whipple, Va., 10th, 8.14½ p. m., brilliant meteor in the east alt. 25°, leaving train of greenish hue; Baltimore, Md., 10th, 8.15 p. m., brilliant meteor in the SE., alt. 35°, bright greenish color, exploded like a rocket, leaving train visible several seconds. Tucson, Arizona, 30th, 10:20 a. m., a large meteor fell at base of mountains, ten miles NE of station, leaving train one mile in length; on striking ground a large volume of smoke ascended, which was plainly visible for 10 or 15 seconds.

Zodiacal Light.—Daytona, Fla., 1st to 3rd; 22nd to 24th; 28th to 31st; Monticello, Iowa., 2nd, 4th, 20th, 24th; Clear Creek, Neb., 19th; Atco, N. J., 1st to 3rd; Bellefontaine, Ohio., 22nd; Wytheville, Va., 1st, 29th, 30th.

Earthquakes.—Steamer "Australia" (at San Francisco, May 22nd, from Sydney,) reports heavy earthquakes at Tanna, in the New Hebrides; land rose twenty feet; harbor seriously injured. February 23rd, at Japan; shock lasting one minute; houses rocked. April 12th or 14th, at 8:30 p. m., a severe earthquake occurred in Venezuela, destroying the town of Cua, in the valley of the Tuy, about thirty miles from Caracas, and burying, at least, three hundred persons; the shock was felt at Caracas, and shocks also continued to be felt until May 4th; about the 19th a portion of the town of Ocumare, 20 miles east of Cua, was thrown down; and on the 29th shocks were felt at Laguayra, Caracas, Porto Cabella and Valencia; 28th, U. S. Naval Hospital, Yokohama, Japan, slight shock. May 8th, Sacramento, Cal., 8:25 p. m., shock from N to S, clocks stopped, pictures shook; also reported to have been felt in Colusa and Mendocino Cos." Red Bluff, 8:25 p. m., "vibration N to S, lasting 10 to 15 seconds, clocks stopped, &c." 10th, U. S. Naval Hospital, Yokohama, Japan, at 9:10 p. m., slight shock. 11th, U. S. Naval Hospital, Yokohama, Japan, 7:40 a. m., slight shock.

Sunsets.—The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been obtained at all Signal Service stations. Reports from 104 stations show 3,210 observations to have been taken; of these 52 were reported doubtful; 2,543 cases, or 79.2 per cent., were followed by the expected weather, and 667 were not.

SOLAR PHENOMENA.

Sun spots.—The following observations, made by Mr. D. P. Todd, have been forwarded by Rear Admiral John Rogers, U. S. N., Superintendent of the U. S. Naval Observatory, Washington, D. C.:

May, 1878.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
2nd, 10 a. m...	1	1	0	0	0	0	1	1	Large group of faculae.
12 m...	0	1	0	0	0	0	1	2	
2 p. m...	0	0	0	0	0	0	1	2	
3rd, 10 a. m...	0	0	0	0	0	0	0	0	Faculae and veiled spots.
4th, 12 m...	0	0	0	0	0	0	0	0	
7th, 4 p. m...	0	0	0	0	0	0	0	0	
5 p. m...	0	0	0	0	0	0	0	0	} Veiled spots and faculae.
10th, 12 m...	1	2	0	0	0	0	1	2	
2 p. m...	0	0	0	0	0	0	1	2	
21st, 10 a. m...	1	1	0	0	0	0	1	1	Veiled spots.
1 p. m...	0	0	0	0	0	0	1	1	
22nd, 12 m...	0	0	0	0	0	0	0	0	
25th, 3 p. m...	2	3	0	0	—	—	2	3	Brilliant faculae.
27th, 11 a. m...	0	10	0	0	0	10	2	13	
28th, 11 a. m...	0	5	0	0	0	0	2	18	
5 p. m...	0	0	0	0	0	0	2	18	
29th, 2 p. m...	0	0	0	0	0	0	2	18	

None visible on the 1st at 11 a. m. and 4 p. m.; 3rd, 1 p. m.; 5th, 3 p. m.; 6th, all day; 8th, 1 p. m.; 11th, 11 a. m.; 13th, 12 m.; 16th, 11 a. m.; 18th, 10 a. m., and 23rd, 11 a. m. The spots visible on the 29th were recorded by the Signal Service Observer at Fort Whipple, Va., as also visible on the 30th, 10 a. m.; and at Portsmouth, N. C., where they continued visible until June 2nd.